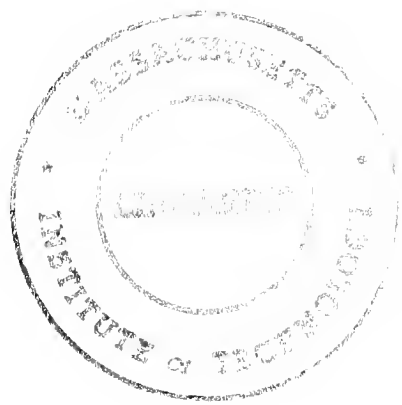

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WHAT MOVES STOCK PRICES?

by

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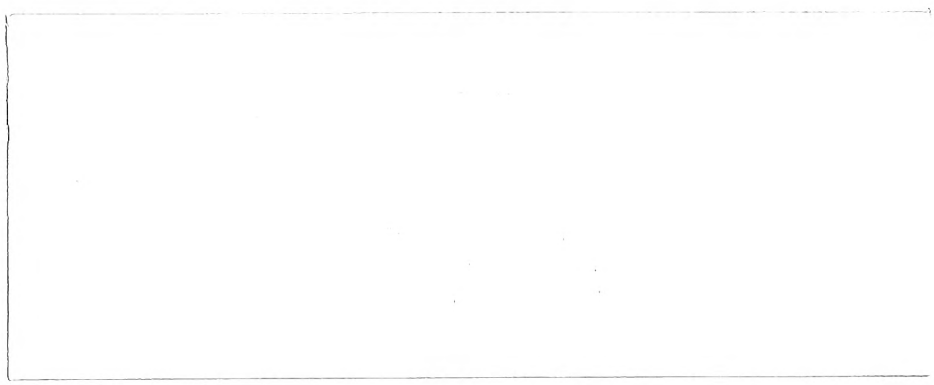

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March 1988

What Moves Stock Prices?

Abstract

This paper estimates the fraction of the variance in aggregate stock returns that can be attributed to various kinds of news. First, we consider macroeconomic news and show that it is difficult to explain more than one third of the return variance from this source. Second, to explore the possibility that the stock market responds to information that is omitted from our specifications, we also examine market moves coincident with major political and world events. The relatively small market responses to such news, along with evidence that large market moves often occur on days without any identifiable major news releases, casts doubt on the view that stock price movements are fully explicable by news about future cash flows and discount rates.

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Financial economics has been enormously successful in explaining the relative prices of different securities. While the powerful intuition of arbitrage has facilitated the pricing of a wide range of financial claims, much less progress has been recorded in accounting for the absolute level of asset prices. The standard approach holds that fluctuations in asset prices are attributable to changes in fundamental values. The voluminous "event study" literature has demonstrated that share prices react to announcements about corporate control, regulatory policy, and macroeconomic conditions that plausibly affect fundamentals. The stronger claim that only news affects asset values is much more difficult to substantiate, however. The apparent absence of fundamental economic news coincident with the dramatic stock market movements of late 1987 is particularly difficult to reconcile with the standard view. This paper explores whether the 1987 market crash is exceptional in this regard, or whether instead a large fraction of significant market moves are difficult to explain on the basis of news events.

Several recent studies of asset pricing have challenged the view that stock price movements are wholly attributable to the arrival of new information. Roll's (1985) analysis of price fluctuations in the market for orange juice futures suggests that news about weather conditions, the primary determinant of the price of the underlying commodity, can explain only a small share of the variation in returns. Shiller's (1981) claim that stock returns are too variable to be explained by shocks to future cash flows, or even by plausible variation in future discount rates, is also an argument for other sources of movement in asset prices.[1] Frankel and Meese (1987) report similar difficulties in explaining exchange rate movements. French and Roll (1986) demonstrate that the variation

[1] Shiller's finding of excessive stock market volatility remains controversial; see West (1987) for a survey of the related literature.

in stock prices is larger when the stock market is open than when it is closed, even during periods of similar information release about market fundamentals.

This paper follows Roll (1985) in estimating the fraction of return variation that can be attributed to various types of news. Unlike his study of a particular market, however, our analysis considers the stock market as a whole. The first section relates stock returns to news about macroeconomic performance, as measured by innovations in vector autoregressions. We find that these news proxies can explain about one third of the variance in stock returns. We also estimate atheoretic equations relating returns to indicators of past and future macroeconomic conditions, again explaining a small fraction of return variation.

It is of course possible that the stock market moves in response to information that does not enter our vector autoregressions. To examine this possibility, section two presents evidence on stock returns coincident with major news events. We begin by following Neiderhoffer (1971) in analyzing stock market reactions to identifiable world news. While news regarding wars, the Presidency, or significant changes in financial policies affects stock prices, the results render it implausible that "qualitative news" can account for all of the return component that cannot be traced to macroeconomic innovations. This conclusion is supported by the observation that many of the largest market movements in recent years have occurred on days when there were no major news events.

Our concluding section argues that further understanding of asset price movements requires two sorts of research. The first should attempt to model price movements as functions of evolving consensus opinions about the implications of given pieces of information. The second should formulate and test theories of "propagation mechanisms" that can explain why shocks with small effects on discount rates or cash flows may have large effects on prices.

1. The Importance of Macroeconomic News

This section explores whether unexpected macroeconomic realizations can explain a significant fraction of share price movements. We analyze monthly stock returns for the 1926-1985 period, as well as annual returns for the longer 1871-1986 period. For each data set, our analysis has two parts. First, we estimate vector autoregressive models for each macroeconomic variable, use these models to identify the unexpected component of each time series, and consider the explanatory power of these "news" measures in regressions explaining stock returns. Second, we adopt a less structured approach and compare the explanatory power of regressions relating stock returns to past information, and regressions relating returns to past, contemporaneous, and future values of macroeconomic time series. The incremental explanatory power of the current and future values measures the importance of macroeconomic news.

We begin by analyzing monthly stock returns for the 1926-1985 period. We consider seven measures of monthly macroeconomic activity, chosen to measure both real and financial conditions[2]: (i) the logarithm of real dividend payments on the value-weighted New York Stock Exchange portfolio, computed as nominal dividends from the Center for Research in Security Prices database deflated by the monthly Consumer Price Index; (ii) the logarithm of industrial production; (iii) the logarithm of the real money supply (M1)[3]; (iv) the nominal long term interest rate, measured as Moody's AAA corporate bond yield[4]; (v) the nominal short term

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[2]Monthly data series were drawn from the Data Resources, Inc. database unless otherwise noted.

[3]Money supply data prior to 1960 are drawn from Friedman and Schwartz (1963). More recent data are from various Federal Reserve Bulletins.

[4]This series is drawn from the Board of Governors of the Federal Reserve System, Banking and Monetary Statistics: 1914-41 and 1941-70, and various issues of the Federal Reserve Bulletin.

interest rate, measured as the yield on three month US Treasury bills; (vi) the monthly CPI inflation rate; and (vii) the logarithm of stock market volatility, defined following French, Schwert, and Stambaugh (1987) as the average squared daily return on the Standard and Poor's Composite Index within the month. Writing these series as $x_{1t}, \ldots, x_{7t}$, we set $X_t = [x_{1t}, \ldots, x_{7t}]'$.

1.1 Structured VAR Evidence

To isolate the news component of these macroeconomic series, we fit vector autoregressions (VARs) of the form:

$$(1) \qquad X_t = A_i(L)*X_{t-1} + \zeta_t$$

where $\zeta_t = [\zeta_{1t}, \ldots, \zeta_{7t}]'$ and $A_i(L)$ is a lag polynomial (we experiment with different lag lengths). This VAR relates the current value of each series to the lagged values of the series itself and of the other five series. Each equation also includes a set of indicator variables for different months. We treat the residuals from (1) as macroeconomic news and use them as explanatory variables for stock returns:

$$(2) \quad R_t = \alpha_0 + \alpha_1*\hat{\zeta}_{1t} + \alpha_2*\hat{\zeta}_{2t} + \alpha_3*\hat{\zeta}_{3t} + \alpha_4*\hat{\zeta}_{4t} + \alpha_5*\hat{\zeta}_{5t} + \alpha_6*\hat{\zeta}_{6t} + \alpha_7*\hat{\zeta}_{7t} + \epsilon_t.$$

R_t is the real, dividend-inclusive return on the value-weighted NYSE index. The $\bar{R}^2$ for equation (2) measures the importance of macroeconomic news in explaining stock movements. We report $\bar{R}^2$ because it is a measure of goodness-of-fit that corrects for the expected explanatory power of additional regressors. While adding irrelevant regressors to an equation will raise the equation's R^2, it will not affect the expected value of the $\bar{R}^2 = (T-1)/(T-K)R^2 - (K-1)/(T-K)$, where T is

the total number of observations, and K the number of degrees of freedom used in estimation.

Table 1 reports estimates of equation (2) using monthly data for both 1926-1985 and 1946-1985. Several conclusions emerge from this table. First, macroeconomic news as we have defined it explains only about one fifth of the movements in stock prices. Increasing the number of lagged values included in the VARs does not substantially alter this finding. Second, most of the macroeconomic news variables affect returns with their predicted signs and statistically significant coefficients.[5] For the full sample period, a positive one percent real dividend surprise raises share prices by about one tenth of one percent, while a one percent increase in industrial production increases share values by about four tenths of one percent. Both inflation and market volatility have negative effects on market returns. A one point inflation innovation lowers share values by about .13 percent.[6] An unanticipated one percent rise in volatility lowers share prices by slightly less than .025 percent, so a doubling of volatility would lower prices by about 2.5 percent. In each case the estimated effects are statistically significant, and for real dividends and volatility, the estimated t-statistics exceed eight.

The other macroeconomic innovations appear to have a less statistically significant effect on share prices. Positive innovations in both long- and short-term interest rates generate negative returns, with the effect of long

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[5] The related investigation by Chen, Roll, and Ross (1986) showed that various macroeconomic "factors" have positive prices. Their study is concerned with explaining the ex ante return on different securities, however, while ours considers the ex post movements in prices that result from macroeconomic innovations.

[6] These findings are consistent with earliers studies such as Fama (1981) that suggest a negative association between unexpected inflation and stock returns.

Table 1: Restricted VAR Evidence on Macroeconomic News and Stock Returns

Lags in VAR	Real Dividends	Industrial Production	Real Money	Interest Rates Long	Interest Rates Short	Inflation	Volatility	$\bar{R}^2$
			Coefficients on Macroeconomic News Variables					
			1926-1985 Sample (Monthly Data)					
3	.081	.427	.195	-2.64	-.682	-.079	-.022	.185
	(.011)	(.112)	(.152)	(1.57)	(.638)	(.071)	(.003)	
6	.094	.398	.074	-2.18	-.586	-.123	-.023	.186
	(.012)	(.113)	(.158)	(1.62)	(.654)	(.073)	(.003)	
12	.116	.373	.066	-1.91	-.967	-.111	-.023	.188
	(.014)	(.121)	(.165)	(1.73)	(.709)	(.079)	(.003)	
24	.138	.382	.155	0.41	-1.340	-.138	-.025	.187
	(.016)	(.133)	(.182)	(2.02)	(0.824)	(.088)	(.004)	
			1946-1985 Sample (Monthly Data)					
3	.050	.100	.180	-2.15	-1.23	-.075	-.017	.149
	(.012)	(.166)	(.355)	(1.24)	(.522)	(.059)	(.003)	
6	.051	.287	.081	-2.15	-1.22	-.110	-.018	.144
	(.013)	(.186)	(.206)	(1.31)	(.546)	(.062)	(.003)	
12	.068	.245	.017	-1.92	-1.73	-.114	-.017	.155
	(.016)	(.193)	(.482)	(1.42)	(.602)	(.072)	(.003)	
24	.078	.073	-.304	.352	-2.21	-.148	-.020	.126
	(.020)	(.235)	(.567)	(1.83)	(.794)	(.095)	(.004)	
			1871-1986 Sample (Annual Data)					
2	-.028	.703*	.264	-.262	-4.68	-.683	-.007	.066
	(.178)	(.428)	(.606)	(3.79)	(1.88)	(.527)	(.029)	
3	-.076	.830*	.344	-.119	-4.94	-.783	-.003	.065
	(.184)	(.446)	(.632)	(4.08)	(2.08)	(.585)	(.029)	
5	-.070	.752*	.239	.172	-5.69	-.399	.003	.020
	(.218)	(.525)	(.721)	(5.03)	(2.34)	(.665)	(.033)	

Dependent variable is the real return on value-weighted NYSE. Estimates correspond to equation (2), with standard errors in parentheses. The news variables are the logarithms of real dividends, industrial production, and real money supply, nominal long-term and short-term interest rates, inflation, and the logarithm of volatility. All VARs and the return equation include a time trend. * Industrial Production is real NNP for the long-term sample period.

rates larger in most specifications. A one hundred basis point increase in long term interest rates would reduce share values by between 1.9 and 2.6 percent. An unexpected increase of one percent in the real money supply raises share prices by about one percent.

We examine the robustness of our findings by performing similar tests for the 1871-1986 period. Since monthly macroeconomic time series are unavailable for this extended period, we focus on annual returns. We measure R_t as the January-to-January return on the Cowles/Standard and Poor's stock price series.[7] Our macroeconomic variables include the logarithm of real dividend payments during the year, the logarithm of real GNP from Romer (1988), the logarithm of real M1, the nominal long term interest rate, the six month commercial paper rate, and the inflation rate for the NNP deflator (all from Friedman and Schwartz (1982)), and the logarithm of stock market volatility, defined as the sum of squared monthly returns on the Cowles/S&P Index within the year.

The results for the longer sample period, presented in the bottom panel of Table 1, are similar to those for the post-1926 period. When two lagged values of the annual series are used in defining news components, the $\bar{R}^2$ in the returns equation is .110. Longer lags in the first stage reduce the extent to which the news can explain returns; with five lagged values the $\bar{R}^2$ declines to .020. Using annual data for the post-1925 period, the $\bar{R}^2$ for the two-lag equation is -.002, and that for the regression including five lags is -.060. The estimated coefficients on the macroeconomic surprises for the 1871-1985 period resemble those for the post-1925 monthly return sample, adjusted for the annual rather than monthly span of the dependent variable, with one notable exceptions. The real dividend

[7] This series was developed by Robert Shiller and was also used in Poterba and Summers (1987).

innovation has a negative coefficient for the long sample, although its large standard error also permits a wide range of positive values.[8]

1.2 Unstructured VAR Evidence

The VAR method of defining macroeconomic news suffers from three potential problems. First, it does not capture news about future macroeconomic conditions that is revealed in period t but not directly reflected in that period's variables. Second, if the VARs are misspecified, our estimated residuals may not accurately reflect new information. For example, if market participants utilize an information set larger than the one we have considered, as they surely do, our residuals may overstate the news content of contemporaneous series. Finally, there are timing issues associated with the release of macroeconomic information. The Consumer Price Index for month t, for example, is announced during month t+1 but market participants may have some information about this variable during month t. These considerations suggest the value of a less structured approach to identifying the importance of macroeconomic news.

We implement such an approach by first regressing stock returns on the lagged values of our macroeconomic time series and then by including current and future values of these time series in the regressions. The incremental $\bar{R}^2$ associated with these additional variables measures the importance of macroeconomic news in stock returns.[9] Table 2 presents results using different

[8] The coefficient on the long term interest rate surprise also changes sign, and is positive, although statistically insignificant different from zero, for the 1871-1986 data sample. For the post-1926 period, this coefficient is negative but insignificantly different from zero.

[9] Including future realizations of macroeconomic time series in return regressions does not completely solve the problem of measuring news that arrives in period t but is not reflected in period t macroeconomic variables. On the one

numbers of lagged and led values of the macroeconomic variables for the 1926-1985 sample of monthly data. The findings are broadly supportive of the results using the more structured VAR approach. Lagged values of the macroeconomic variables we consider can explain less than five percent of the variance of returns. Including the contemporaneous values of the seven macro variables significantly raises the explanatory power of these equations. With only one lagged value of X_t included, the $\bar{R}^2$ rises to .14 and with twenty-four lags of each variable the $\bar{R}^2$ is .29. Including the one- and two-period led values of the macro variables raises the $\bar{R}^2$ even further, to .29 when only one lagged value of the series is included and as high as .39 when the longer lags are included. Results for the postwar period, presented in the middle panel of Table 2, are broadly consistent with those for the longer sample period. The lagged regressors have somewhat greater explanatory power in the more recent period.

We also applied our less structured approach to the annual data sample, 1871-1986. The explanatory power of the regressions with only lagged values of macro variables is greater for the annual data than for the monthly, ranging from .079 with one lag of each variable to a high of .123 with five lags. Adding the contemporaneous values of macroeconomic series again raises the $\bar{R}^2$ with the biggest gain a jump from .079 to .211 when only one lagged value is included. The incremental explanatory power of the contemporaneous macroeconomic variables is therefore similar to that in the monthly analysis.

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hand, it may understate the true explanatory power of news since our news variables still omit changes in expectations about the distant future that are not reflected in our short-horizon variables. A countervailing force, however, arises if movements in the stock market influence subsequent macroeconomic realizations. If a decline in the stock market due to variables outside our information set induces a subsequent drop in the level of industrial production, our approach of including future macroeconomic realizations will overstate the role of expectational revisions in period t in accounting for share price movements.

Table 2: Unrestricted VAR Evidence on Macro News and Stock Returns

Number of Lags in Specification	$\bar{R}^2$ for Equations Including: Lagged	Lagged & Current	Lagged, Current, & Led
	1926-1985 Sample (Monthly Data)		
1	.005	.139	.292
3	.010	.192	.333
6	.018	.208	.343
12	.034	.250	.360
24	.035	.289	.393
	1946-1985 Sample (Monthly Data)		
1	.060	.194	.318
3	.087	.254	.332
6	.080	.259	.327
12	.065	.267	.327
24	.136	.355	.396
	1871-1986 Sample (Annual Data)		
1	.079	.211	.531
2	.117	.150	.521
3	.108	.163	.516
5	.123	.107	.541

Each entry reports the $\bar{R}^2$ from a regression of the real value-weighted NYSE return (Cowles return in annual data) on k lagged values, k lagged values and the current value, or k lagged, two led, and the current value, of the six macroeconomic series noted in Table 1. Column one reports k. For the annual data, only one led value is included.

Table 2 also reports the $\bar{R}^2$ for annual equations including lagged, contemporaneous, and one led value of the macro series. The $\bar{R}^2$ exceeds .50, but this almost surely overstates the effect of macro news on share prices since it also includes the effect of higher share prices on economic outcomes within the following year.[10] Fischer and Merton (1984), for example, show that stock returns in year t can explain more than half of the variation in GNP growth in year t+1. While the same problem arises in our monthly analysis, with annual data the possibility of large feedback from the market to the economy rises substantially.

2. Big News and Big Moves: Are They Related?

Although macroeconomic developments are one important source of market-relevant news, the last section's analysis excludes a variety of other important factors. Political developments that affect future policy expectations and international events (such as wars) that affect risk premia should also be important in asset pricing. This section examines the importance of these other factors in two ways. First, we study the stock market reaction to major non-economic events such as elections and international conflicts. Neiderhoffer (1971) conducted a similar investigation for a wider sample of events during the 1960s. Second, we analyze the largest stock market movements of the last fifty years and review coincident news reports to identify, where possible, the

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[10] The future dividend variable is the major source of the impresssive fit when led values are included. The link between these series, however, is likely to be much stronger than would be the case if it reflected only information about t+1 dividends that was released (and incorporated in prices) at t. In a model where dividends adjust to lagged share prices, as in Marsh and Merton (1986), future dividends be associated with current prices, but the principal causality is reversed.

proximate causes of these moves.

We begin by analyzing stock market reactions to non-economic events. We identified a sample of such events using the "Chronology of Important World Events" from the World Almanac. We excluded events listed in the almanac that we thought were unlikely to affect the stock market. We narrowed our set of events still further by considering only those events which the New York Times carried as the lead story, and which the New York Times Business Section reported as having a significant effect on stock market participants.[11] Our resulting sample of forty-nine events includes a variety of political, military, and economic policy developments.

Table 3 lists these forty-nine events along with their associated percentage change in the Standard & Poor's 500-Stock Index. Some of the events are clearly associated with substantial movements in the aggregate market. On the Monday after President Eisenhower's heart attack in September 1955, for example, the market declined by 6.62%. The Monday after the Japanese attack on Pearl Harbor witnessed a market decline of 4.37 percent. The orderly presidential transition after President Kennedy was assasinated coincided with a 3.98% market uptick, while the actual news of the assassination reduced share values by nearly three percent. For the set of events we analyze, the average absolute market move is 1.46 percent, in contrast to 0.56 percent over the entire 1941-1987 period.

These findings, however, suggest a surprisingly small effect of non-economic news, at least of the type we have identified, on share prices. The standard

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[11] Winnowing the sample of political events this way biases our sample toward those news items that are likely to have had the largest impact on stock prices. This unabashed sample selection process should therefore bias our results toward finding a large stock market reaction to news announcements; including the various other events in the Almanac would reduce the return variation on "event days."

Table 3: Major Events and Changes in the S&P Index, 1941-1987

Event	Date	Percent Change
Japanese bomb Pearl Harbor	Dec. 8, 1941	-4.37%
US declares war against Japan	Dec. 9, 1941	-3.23%
Roosevelt defeats Dewey	Nov. 8, 1944	-0.15%
Roosevelt dies	Apr. 13, 1945	1.07%
Atomic bombs dropped on Japan:		
Hiroshima bomb	Aug. 6, 1945	0.27%
Nagasaki bomb; Russia delcares war	Aug. 9, 1945	1.65%
Japanese surrender	Aug. 17, 1945	-0.54%
Truman defeats Dewey	Nov. 3, 1948	-4.61%
North Korea invades South Korea	June 26, 1950	-5.38%
Truman to send US troops	June 27, 1950	-1.10%
Eisenhower defeats Stevenson	Nov. 5, 1952	0.28%
Eisenhower suffers heart attack	Sep. 26, 1955	-6.62%
Eisenhower defeats Stevenson	Nov. 7, 1956	-1.03%
U-2 shot down; US admits spying	May 9, 1960	0.09%
Kennedy defeats Nixon	Nov. 9, 1960	0.44%
Bay of Pigs invasion announced;	Apr. 17, 1961	0.47%
details released over several days	Apr. 18, 1961	-0.72%
	Apr. 19, 1961	-0.59%
Cuban Missile Crisis begins:		
Kennedy announces Russian buildup	Oct. 23, 1962	-2.67%
Soviet letter stresses peace	Oct. 24, 1962	3.22%
Formula to end dispute reached	Oct. 29, 1962	2.16%
Kennedy assassinated;	Nov. 22, 1963	-2.81%
Orderly transfer of power to Johnson	Nov. 26, 1963	3.98%
US fires on Vietnamese ship	Aug. 4, 1964	-1.25%
Johnson defeats Goldwater	Nov. 4, 1964	-0.05%
Johnson withdraws from race; halts Vietnamese raids; urges peace talks	Apr. 1, 1968	2.53%
Robert Kennedy assassinated	June 5, 1968	-0.49%
Nixon defeats Humphrey	Nov. 6, 1968	0.16%

(Table 3, continued)

Event	Date	Percent Change
Nixon imposes price controls, requests Federal tax cut; strengthens dollar	Aug. 16, 1971	3.21%
Nixon defeats McGovern	Nov. 8, 1972	0.55%
Haldeman, Ehrlichman, Dean, resign	Apr. 30, 1973	-0.24%
Dean tells Senate about Nixon cover-up	June 25, 1973	-1.40%
Spiro Agnew resigns	Oct. 10, 1973	-0.83%
Carter defeats Ford	Nov. 3, 1976	-1.14%
Volcker appointed to Fed	July 25, 1979	1.09%
Fed announces major policy changes	Oct. 6, 1979	-1.25%
Soviet Union invades Afghanistan	Dec. 26, 1979	0.11%
Attempt to free Iranian hostages fails	Apr. 26, 1980	0.73%
Reagan defeats Carter	Nov. 5, 1980	1.77%
Reagan shot; NYSE closes early; reopens next day	Mar. 30, 1981 Mar. 31, 1981	-0.27% 1.28%
US Marines killed in Lebanon	Oct. 24, 1983	0.02%
US invades Grenada	Oct. 25, 1983	0.29%
Reagan defeats Mondale	Nov. 7, 1984	1.09%
House votes for Tax Reform Act of 1986	Dec. 18, 1985	-0.40%
Chernobyl nuclear reactor meltdown; details released over several days	Apr. 29, 1986 Apr. 30, 1986	-1.06% -2.07%
Senate Committee votes for tax reform	May 8, 1986	-0.49%
Greenspan named to replace Volcker	June 2, 1987	-0.47%
Important Events		
Average Absolute Return		1.46%
Standard Deviation of Returns		2.08%
All Days Since 1941		
Average Absolute Return		0.56%
Standard Deviation of Returns		0.82%

deviation of returns on the news days we have identified is 2.08%, compared with the daily average of .82% for post-1941 period. This implies that the typical day in Table 4 is equivalent to 6.40 "ordinary" days, if the calibration is based on the variance of returns. The standard deviation of annual returns would be 32 percent, instead of 13 percent, if every day involved as much news as the days in this sample. Since most days do not witness comparably important developments, it may be difficult to explain the "missing variation" in stock returns with events of this kind.

An alternative strategy for identifying the importance of news is to examine large changes in share prices and related news developments. Table 4 lists the fifty largest one-day returns on the Standard & Poor's Composite Stock Index since 1946, along with the New York Times account of fundamental factors that affected prices. It is difficult to link major market moves to release of economic or other information. On several of the days, the New York Times actually reported that there were no apparent explanations for the share rise or decline. At the other extreme, some of the days clearly mark important information releases; the 1948 election outcome, President Eisenhower's heart attack, and the announcement of President Kennedy's success in rolling back the 1962 steel price increase are examples. On most of the sizable return days, however, the information that the press cites as the cause of the market move is not particularly important. Press reports on adjacent days also fail to reveal any convincing accounts of why future profits or discount rates might have changed. Our inability to identify the fundamental shocks that accounted for these significant market moves is difficult to reconcile with the view that such shocks account for most of the variation in stock returns.

Table 4: Fifty Largest Postwar Movements in S&P Index and Their "Causes"

	Date	Percent Change	New York Times Explanation
1	Oct. 19, 1987	-20.47%	Worry over dollar decline and trade deficit; Fear of US not supporting dollar.
2	Oct. 21, 1987	9.10%	Interest rates continue to fall; deficit talks in Washington; bargain hunting.
3	Oct. 26, 1987	-8.28%	Fear of budget deficits; margin calls; reaction to falling foreign stocks
4	Sep. 3, 1946	-6.73%	"... no basic reason for the assault on prices."
5	May 28, 1962	-6.68%	Kennedy forces rollback of steel price hike.
6	Sep. 26, 1955	-6.62%	Eisenhower suffers heart attack.
7	Jun. 26, 1950	-5.38%	Outbreak of Korean War.
8	Oct. 20, 1987	5.33%	Investors looking for "quality stocks".
9	Sep. 9, 1946	-5.24%	Labor unrest in maritime and trucking industries.
10	Oct. 16, 1987	-5.16%	Fear of trade deficit; fear of higher interest rates; tension with Iran.
11	May 27, 1970	5.02%	Rumors of change in economic policy. "...the stock surge happened for no fundamental reason."
12	Sep. 11, 1986	-4.81%	Foreign governments refuse to lower interest rates; crackdown on triple witching announced
13	Aug. 17, 1982	4.76%	Interest rates decline.
14	May 29, 1962	4.65%	Optimistic brokerage letters; institutional and corporate buying; suggestions of tax cut.
15	Nov. 3, 1948	-4.61%	Truman defeats Dewey.
16	Oct. 9, 1974	4.60%	Ford to reduce inflation and interest rates.
17	Feb. 25, 1946	-4.57%	Weakness in economic indicators over past week.
18	Oct. 23, 1957	4.49%	Eisenhower urges confidence in economy.
19	Oct. 29, 1987	4.46%	Deficit reduction talks begin; durable goods orders increase; rallies overseas
20	Nov. 5, 1948	-4.40%	Further reaction to Truman victory over Dewey.

	Date	Percent Change	New York Times Explanation
21	Nov. 6, 1946	-4.31%	Profit taking; Republican victories in elections presage deflation
22	Oct. 7, 1974	4.19%	Hopes that President Ford would announce strong anti-inflationary measures
23	Nov. 30, 1987	-4.18%	Fear of dollar fall
24	Jul. 12, 1974	4.08%	Reduction in new loan demands; lower inflation previous month
25	Oct. 15, 1946	4.01%	Meat prices decontrolled; prospects of other decontrols
26	Oct. 25, 1982	-4.00%	Disappointment over Federal Reserve's failure to cut discount rates
27	Nov. 26, 1963	3.98%	Confidence in President Johnson after Kennedy assassination
28	Nov. 1, 1978	3.97%	Steps by Carter to strengthen dollar
29	Oct. 22, 1987	-3.92%	Iranian attack on Kuwaiti oil terminal; fall in markets overseas; analysts predict lower prices
30	Oct. 29, 1974	3.91%	Decline in short term interest rates; ease in future monetary policy; lower oil prices
31	Nov. 3, 1982	3.91%	Relief over small Democratic victories in House
32	Feb. 19, 1946	-3.70%	Fear of wage-price controls lowering corporate profits; labor unrest.
33	Jun. 19, 1950	-3.70%	Korean War continues; fear of long war
34	Nov. 18, 1974	-3.67%	Increase in unemployment rate; delay in coal contract approval; fear of new mid-East war
35	Apr. 22, 1980	3.64%	Fall in short term interest rates; analysts express optimism
36	Oct. 31, 1946	3.63%	Increase in commodity prices; prospects for price decontrol
37	Jul. 6, 1955	3.57%	Market optimism triggered by GM stock split
38	Jun. 4, 1962	-3.55%	Profit taking; continuation of previous week's decline
39	Aug. 20, 1982	3.54%	Congress passes Reagan tax bill; prime rate falls

	Date	Percent Change	New York Times Explanation
40	Dec. 3, 1987	-3.53%	Computerized selling; November retail sales low
41	Sep. 19, 1974	3.50%	Treasury Secretary Simon predicts decline in short term interest rates
42	Dec. 9, 1946	3.44%	Coal strike ends; railroad freight rate increase
43	Jun. 29, 1962	3.44%	"...stock prices advanced strongly chiefly because they had gone down so long and so far that a rally was due."
44	Sep. 5, 1946	3.43%	"Replacement buying" after earlier fall
45	Oct. 20, 1987	3.33%	Dollar stabilizes; increase in prices abroad
46	Jan. 27, 1975	3.27%	IBM wins appeal of antitrust case; short term interest rates decline
47	Oct. 6, 1982	3.27%	Interest rates fall; several large companies announce increase in profits
48	Jul. 19, 1948	-3.26%	Worry over Russian blockade of Berlin; possibility of more price controls
49	Nov. 30, 1982	3.23%	"...analysts were at a loss to explain why the Dow jumped so dramatically in the last two hours..."
50	Oct. 24, 1962	3.22%	Khrushchev promises no rash decisions on Cuban Missile Crisis; calls for US-Soviet summit.

The last column is per the New York Times financial section or front page.

3. Conclusions

Our results suggest the difficulty of explaining as much as half of the variance in stock prices on the basis of publicly available news bearing on fundamental values. Of course it is possible that we have failed to consider some type of news that actually accounts for a sizable fraction of asset price volatility. Although the hypothesis that stock prices move in response to news that is observed by market participants but not by investigators studying the market is irrefutable, we are skeptical of this possibility. News important enough to account for large swings in the demand for corporate equities would almost surely leave traces in either official economic statistics or media reports about market movements.

The problem of accounting for price changes on the basis of fundamental values is not confined to the overall stock market. Studies of price behavior in settings where fundamental values can be measured directly have similar trouble in explaining prices. The classic example is closed end mutual funds, discussed by Malkiel (1977) and several more recent studies. During the last twenty years these funds have traded at both discounts and premia relative to their net asset value. At any moment the cross-sectional dispersion in discounts is substantial and difficult to link to fundamental factors. The widely-documented patterns in stock returns over weekends, holidays, and different calendar periods, summarized in Thaler (1987a,b), are also difficult to attribute to news about fundamentals, since it is unlikely that fundamental values move systematically over these periods.

The view that movements in stock prices reflect something other than news about fundamental values is consistent with evidence on the correlates of ex-post returns. If prices were sometimes driven from fundamental values by something

other than news but ultimately returned to fundamentals, one would expect a tendency for returns to be low when the market was high relative to some indicator of fundamental value, and high when the market was low relative to fundamental value. Such patterns emerge from studies of ex post returns that use the past level of prices, earnings, and dividends as indicators of fundamental value.[12]

Our results underscore the problem of accounting for the variation in asset prices that is not attributable to news about fundamental values. Throwing up one's hands and simply saying that there is a great deal of irrationality that gives rise to "fads" is not constructive. Two more concrete lines of attack strike us as potentially worthwhile. First, volatility may reflect changes in average assessments of given sets of information regarding fundamental values that take place as existing data are re-examined or new arguments are presented. This view is suggested by the empirical observation that the magnitude of asset price changes is correlated with the volume of trading (see for example Schwert (1987)), and the finding that return volatility is greater when the market is open than when it is closed (French and Roll (1986)).

Second, in accounting for volatility it may be fruitful to explore propagation mechansims that could cause relatively small shocks to have large effects on market prices. "Informational freeloading" on observed asset prices may have something to do with the market's extreme volatility. In a world where most investors accept prices as indicators of fundamental value, small changes in the supply of or demand for securities can have large effects on prices. Suppose,

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[12] Campbell and Shiller (1988), Fama and French (1987,1988), Poterba and Summers (1987), and Shiller (1984) find evidence consistent with this view. Models which explain the predictability of returns on the basis of trading by uninformed "noise traders" have been discussed by Black (1986) and DeLong, Shleifer, Summers, and Waldman (1987).

for example, that all investors desired to hold the market portfolio in order to achieve optimum diversification, except for one investor who wished to concentrate his holdings on a single security regardless of its price. The equilibrium price of this security would be infinite. This example, while extreme because speculators would intervene to sell an irrationally demanded stock well before its price approached infinity, makes an important point. If many investors accept market prices as indicators of value and so do not trade on the basis of their own assessment of values, market values will be more susceptible to those who trade on the basis of their own opinions.

The possibility that many investors do not formulate their own estimates of fundamental values is consistent with trading patterns surrounding the sharp stock market decline of October 1987. Despite the market's dramatic drop, the vast majority of shares were not traded. This is only explicable if investors rely on market prices to gauge values, or if investors received information that led to significant downward revisions in fundamental values. It seems difficult, however, to identify the information that would support the second explanation.

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